by directly interfering with the respiratory exchanges occurring in the tissues. The objections to its use as an antipyretic are that, owing to its poisonous properties, it is difficult to inject it subcutaneously in sufficiently small doses, while it is not easy to obtain a solution in any menstruum in which decomposition will not take place. If a convenient method of dissolving it could be devised, $Ni(CO)_4$ might become a valuable antipyretic, the *modus operandi* of which is intelligible.[1]

SOCIETIES AND ACADEMIES.

LONDON.

Chemical Society, April 2.—Mr. W. Crookes, F.R.S., Vice-President, in the chair.—The following papers were read :—Citraconfluorescein, by J. T. Hewitt. Lunge and Burckhardt have shown that maleic anhydride is capable of yielding a fluorescein ; the author has obtained the corresponding fluorescein from citraconic anhydride, by the action of resorcinol in the presence of sulphuric acid. Citraconfluorescein is easily soluble in alcohol and glacial acetic acid, fairly soluble in water ; the aqueous solution is yellowish-brown and shows a green fluorescence.—Ethylic thiacetacetate, by Dr. C. T. Sprague. Hübner obtained ethylic thiacetacetate by the action of sulphur monochloride, S_2Cl_2, on ethylic acetacetate. It has since been obtained by Delisle by the action of sulphur dichloride, SCl_2, on ethylic acetacetate ; by Schönbrodt by the action of sulphur on the copper derivative of ethylic acetacetate ; and by Michaelis and Phillips from thionyl chloride and ethylic acetacetate. Buchka proposed the formula $S(CH.Ac.CO_2Et)_2$, but an alternative formula, $S(O.C:CH.CO_2Et)_2$, was suggested by Delisle. The author describes the preparation of the substance and the products of its interaction with hydrazines ; and shows that it behaves towards phenylhydrazine in the same manner as ethylic acetacetate. The results are in accordance with the formula proposed by Buchka.—The function of chlorine in acid chlorides as exemplified by sulphuryl chloride, by H. E. Armstrong. A number of experiments carried out during recent years in the author's laboratory show that sulphuryl chloride, SO_2Cl_2, acts on benzenoid compounds simply as a chlorinating agent. Sulphuryl chloride is easily formed by the direct union of sulphur dioxide and chlorine in the presence of a catalyst, such as camphor, charcoal, or acetic acid ; it is a highly mobile liquid of low boiling-point, and is acted on with extreme slowness by water and alkaline solutions. It is an inert substance possessed of properties by no means such as are usually regarded as characteristic of acid chlorides. The chlorine is apparently but loosely held, and is easily withdrawn by a compound having an affinity for chlorine, such as naphthalene. On warming a mixture of this hydrocarbon and sulphuryl chloride, SO_2 is evolved and naphthalene tetrachloride is produced. The author doubts whether the chlorine in acid chlorides is possessed of special activity, and is inclined to the view that the activity of acid chlorides is conditioned by the oxygen rather than the chlorine ; this view being supported by the observations of Wagner and Saytzeff, and the later ones of Pawlow (*Annalen*, clxxxviii. 104). The author also discusses the action of SO_3HCl, and the analogous compound $SO_3.EtCl$, and points out that pyrosulphuryl chloride, $S_2O_5Cl_2$, behaves much as if it consisted of SO_3 and SO_2Cl_2.—The action of nitric acid on the ligno-celluloses, by C. F. Cross and E. J. Bevan. Dilute nitric acid attacks the ligno-celluloses when heated with them at 60°, with the formation of a bright yellow derivative of lignone and nitrous acid On further interaction, large quantities of nitrous oxide, N_2O, are evolved, together with carbonic anhydride and a small proportion of nitric oxide. A sensible quantity of hydrogen cyanide is also produced, the proportion being increased by increase of temperature. The observations point to the entrance of the NOH residue into the lignone molecule ; its interaction with nitrous acid being finally the displacement of H_2 by O. The reaction is probably general for compounds containing the NOH residue, and the authors suggest that attention be paid to the gaseous products of the interaction of nitric acid and carbon compounds, as calculated to elucidate their mechanism.—The Chairman, Mr. Crookes, gave a short verbal account of observations on the volatilization of metals *in vacuo* under the influence of an electric discharge.

April 16.—Prof. A. Crum Brown, F.R.S., President, in the chair.—The following papers were read :—Studies on the formation of substitution derivatives, by H. Gordon. The following experiments were undertaken with the object of throwing further light on the laws which govern substitution in the case of benzenoid compounds. *The action of bromine on diorthonitrophenol.*-When bromine is added to an acetic acid solution of diorthonitrophenol at ordinary temperatures, the normal product, namely parabromdiorthonitrophenol, is obtained. However, if the mixture be heated at 100° for a short time, a mixture is obtained consisting of parabromdiorthonitrophenol and orthobromorthoparadinitrophenol. And if the heating be prolonged, and small quantities of bromine added, the mixed product is converted into orthobromorthoparadinitrophenol. Parabromdiorthonitrophenol is therefore completely converted by the action of heat, and bromine into the isomeric orthobromorthoparadinitrophenol. The same isomeric change takes place under the influence of nitric acid. An acetic acid solution of parabromdiorthonitrophenol, when heated with a few drops of nitric acid at 100°, is completely converted into the isomeric orthobromorthoparadinitrophenol. Experiments were then undertaken with the corresponding chloro-compounds. It was found that chlorine had no action on diorthonitrophenol when dissolved in acetic acid at 100°, even in the presence of iodine. Chlorination, however, takes place when chlorine is passed into a solution of diorthonitrophenol in antimony pentachloride at 105°, and only the normal product parachlorodinitrophenol is formed. *Action of bromine on parachlordiorthonitrophenol.*-Experiments to ascertain whether isomeric change could be effected by the action of bromine on parachlordinitrophenol only gave negative results, the normal product, parachlororthobromorthonitrophenol, being obtained in every case. The author considers that in the case of the chlorine compound isomeric change does not take place, because the chlorine is more firmly held than bromine. *Action of sulphuric acid on orthoparadichlorphenol-orthosulphonic acid.*-The combined action of heat and sulphuric acid on orthoparadichlorphenolsulphonic acid gave no indication of any isomeric change taking place, although the reaction was investigated under a great variety of conditions of temperature, &c. The corresponding dibromphenol also gave negative results, but as several secondary reactions set in, such as the formation of tribromphenol, this reaction was not further investigated. *The chlorination and bromination of phenol.*-Phenol when chlorinated in the ordinary manner yields a mixture of para- and ortho- chlorphenol. The author finds that a similar mixture is obtained when SO_2Cl_2 is employed as the chlorinating agent. He has also investigated the action of bromine on phenol under the conditions described by Hübner and Brenken (*Ber.* vi. 170), and finds that the product is practically pure parabromphenol. *The sulphonation of the nitrophenols.*-Orthonitrophenol and paranitrophenol are, according to Armstrong, both readily acted upon by SO_3HCl; the former yields the well-known sulpho-acid ; the latter yields a product which is decomposed by water, and was supposed by Armstrong to be the sulphate, and this the author finds to be the case. The author considers that the initial action in both cases is the same ; but that the sulphate formed from orthonitrophenol at once undergoes isomeric change, whereas the sulphate from paranitrophenol is more stable. The author did not succeed in obtaining any sulpho-acid by heating the sulphate from the paranitrophenol at 100°. But he obtained a fair yield of sulpho-acid by heating the nitrophenol with two molecular proportions of SO_3HCl at 100°. Hence, there is little doubt that the paranitrophenolsulphonic acid is formed by the sulphonation of the sulphate. Metanitrophenol resembles the para-compound in being converted into sulphate, but not into the sulpho-acid even by the action of heat.—Compounds of dextrose with the oxides of nickel, chromium, and iron, by A. C. Chapman. The nickel compound is obtained by adding a solution of nickel hydrate in ammonia to a solution of dextrose in 90 per cent. alcohol. It is a green amorphous substance, insoluble in water and alcohol, of the composition $C_6H_{12}O_6.2NiO + 3H_2O$. The chromium compound, which appears to have the composition represented by the formula $C_6H_{12}O_6.Cr_2O_3 + 4H_2O$, is prepared by dissolving an excess of dextrose in an aqueous solution of chromic chloride, and pouring this solution into cold strong ammonia. The precipitated hydrate partly dissolves on standing, and on pouring the purple solution so obtained into 90 per cent. alcohol, the chromium dextrosate is obtained as a lilac-coloured precipitate. The iron compound, $2C_6H_{12}O_6.3Fe_2O_3$

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[1] This investigation was carried on during last winter. It appears that M. Hanriot made a communication of the subject to the Société Chimique on February 27. He found the substance to be more poisonous than CO, and that the blood gave the spectrum of carbon-monoxide-hæmoglobin.

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$+ 3H_2O$, is obtained by adding a slight excess of ammonia to a solution of ferric chloride containing an excess of dextrose; on standing, a deep red solution is obtained, which when poured into 90 per cent. alcohol yields the dextrosate of iron as a red flocculent precipitate. The moist compound dissolves easily in water to a red solution, is decomposed on boiling, but is not decomposed by ammonia, potassic ferrocyanide, or potassic thiocyanate. The dry compound is insoluble in water.—A rapid method of estimating nitrates in potable waters, by Dr. G. Harrow. The method depends on the reduction of nitric to nitrous acid by means of zinc dust and hydrochloric acid, in a very dilute solution, in the presence of α-naphthylamine and sulphuric acid; the estimation is made by comparing the depths of the pink azo-coloration developed in the solution with that arising on similar treatment of standard nitrate solutions. When nitrites are present, the amount is estimated in a similar manner prior to the addition of zinc dust, and due allowance is subsequently made. A number of comparisons with the Crum method show that very satisfactory results are obtainable.—The "gravivolumeter," an instrument by means of which the observed volume of a single gas gives directly the weight of the gas: a preliminary note, by F. R. Japp, F.R.S. The author describes a method of constructing a gas apparatus, by means of which, with an ordinary graduation in cubic centimetres, any required single gas may, without observation of temperature or pressure and without calculation, be measured under such conditions that each cubic centimetre represents a milligram of the gas. The author describes the apparatus in detail and the method of using it, and he anticipates that it will, at least, give results sufficiently accurate for technical purposes.—Mr. de Mosenthal exhibited one of Lipmann's coloured photographic negatives.—The action of acetic acid on phenylthiocarbimide, by J. C. Cain and Dr. J. B. Cohen, Owens College. The authors show that the product of the action of pure glacial acetic acid on phenylthiocarbimide is not diacetanilide, as stated by Hofmann; but that two compounds are formed—namely, diphenylurea and acetanilide. At low temperatures diphenylurea is mainly formed, at higher temperatures acetanilide. The reactions may be expressed by the following equations:—

$$2C_6H_5NCS + 6C_2H_4O_2 = (C_6H_5NH)_2CO + 3(C_2H_3O)_2.O + 2H_2S + CO_2$$

and

$$(C_6H_5NH)_2CO + 2C_2H_4O_2 = 2C_6H_5NH_2 + (C_2H_3O)_2O + CO_2.$$

—The action of aluminium chloride on benzenoid acid chlorides, by R. E. Hughes, Jesus College, Oxford. The author has examined the action of aluminium chloride on cinnamic and hydrocinnamic chlorides, in the expectation that pentamethylene derivatives might result. The experiments, however, afforded negative results. The chloride was either dissolved in or mixed with light petroleum, and aluminium chloride then added; action set in at 80–90° in the case of cinnamic, and at 50° and more briskly in the case of hydrocinnamic, chloride. The chief product in both cases was an ill-characterized substance, which has not been examined. The author also describes the following compounds: hydrocinnamic chloride, hydrocinnamide, and hydrocinnamanilide. It is noted that benzoic and cinnamic acids may be readily separated by treating the mixture with phosphorus pentachloride and distilling the product under reduced pressure; the portion passing over below 95° under 10 mm. contains the benzoic chloride.

PARIS.

Academy of Sciences, May 11.—M. Duchartre in the chair.—Essay on graphical dynamics, with reference to the periods of motion of hydraulic motors, by M. H. Léauté.—On the lowering of the surface of water in a horizontal cylindrical vessel, by M. Haton de la Goupillière.—On the boundaries of the littoral zones, by M. Léon Vaillant.—Observations made at Marseilles Observatory of the asteroid (308) discovered on March 31, by M. Borrelly. The observations for position extend from April 6 to April 30.—Elements of the orbit of Borrelly's new asteroid (308), by M. Fabry.—Provisionary elements of Borrelly's asteroid deduced from observations made at Marseilles Observatory on March 30, April 8, 18, and 26, by M. Esmiol.—Solar observations made at the Royal Observatory of the Roman College during the first quarter of 1891, by M. Tacchini.—On the movement of the moon's perigee, by M. Perchot.—On limited permutations, by M. C. A. Laisant.—On a class of complex numbers, by M. Markoff.—On a registering manometer applicable to pieces of ordnance, by M. P. Vieille.—An "elastic" theory of plasticity and fragility of solid bodies, by M. Marcel Brillouin.—On the wave-surface in crystals, by M. C. Raveau.—On the determination of the dielectric constant of glass by means of very rapid electrical oscillations, by M. R. Blondlot. The author has made some experiments which support Prof. J. J. Thomson's conclusion that the specific inductive capacity of glass is very nearly equal to the square of the index of refraction, and has least value when a slow frequency of vibration is employed.—On a new compound of oxygen and tungsten, by M. E. Péchard.—Thermic study of bibasic organic acids with simple functions, by M. G. Massol.—Remark on the preceding note, by M. Berthelot.—On the fourth primary amyl-alcohol, by M. L. Tissier.—On the diffusion of fresh water into sea-water, by M. J. Thoulet.—On the theory of M. Tschermak's felspars, by M. K. de Kroustchoff. A description is given of a new triclinic felspar having a composition very similar to oligoclase, but distinguished from it by several peculiarities.—On the genital organs of some Tristomidæ, by M. G. Saint-Remy.—On the constitution of the sexual nuclei of plants, by M. Léon Guignard.—On the groups of the genus *Clusia*, by M. J. Vesque.—The parasitic fungus of the larva of the cockchafer, by MM. Prillieux and Delacroix.—The parasite of the cockchafer, by M. Le Moult.—On a remarkable inversion of strata termed *pli couché* observed near Toulon, by MM. Marcel Bertrand and Zurcher.—On the permanence of the orogenic effort in the Pyrenees during the geological periods, by M. Roussel.

AMSTERDAM.

Royal Academy of Sciences, April 24.—Prof. van de Sande Bakhuyzen in the chair.—Mr. van der Waals dealt with a formula for electrolytic dissociation, which may be deduced from his theory of a mixture. This formula accounts for the facts (1) that ions may combine with absorption of heat; (2) that the parameter of electrolytic dissociation varies with the medium which holds the salt-molecules in solution; (3) that the quantity of free ions may diminish when the quantity of salt-molecules increases.

CONTENTS.

PAGE
Pycnogonids. By **E. P. W.** 49
A Text-book of Chemistry based on the Periodic System 50

Our Book Shelf:—

Roberts: "Eighteen Years of University Extension" . 52
Hepworth: "Evening Work for Amateur Photographers" 52

Letters to the Editor:—

The University of London Question.—**W. T. Thiselton Dyer, C.M.G., F.R.S.; F. Victor Dickins** 52
Co-adaptation.—**Prof. George J. Romanes, F.R.S.** 55
A priori Reasoning.—**Prof. George Henslow** . . . 55
The Natural Selection of Indian Corn.—**T. D. A. Cockerell** 56
The Soaring of Birds. (*With Diagrams.*)—**S. E. Peal** 56
On some Points in the Early History of Astronomy. III. (*Illustrated.*) By **J. Norman Lockyer, F.R.S.** . 57
Forestry in North America. By **Prof. W. K. Fisher** 60
Daily International Weather Charts 62
Joseph Leidy, M.D. 63
The Science Museum 63
Notes 65

Our Astronomical Column:—

The Photography of Faint Nebulæ 69
Variations in Latitude 69
Re-discovery of Wolf's Comet (1884 III.) 69
The Paris Observatory. By **W. J. L.** 70
Notes on the Physiological Action of Carbon-Monoxide of Nickel. By **Prof. John G. McKendrick, F.R.S., and William Snodgrass** 70
Societies and Academies 71

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